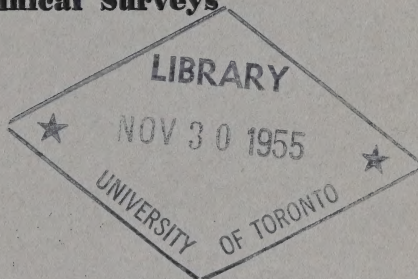


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Canada
Department of Mines
and Technical Surveys



Annual] Report of the

EXPLOSIVES

DIVISION

Calendar Year
1954



Canada
Department of Mines
and Technical Surveys

Report of the

EXPLOSIVES
DIVISION

Calendar Year 1954

by
W. P. CAMPBELL
Chief Inspector

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This report deals with the administration of the Explosives Act for the year ended December 31, 1954. It supplements the brief report of the Explosives Division which appears in the Annual Report of the Department for the fiscal year 1953-54.

Offices

The Explosives Division maintains its main offices at 238 Sparks Street, Ottawa, and branch offices at 300 West Pender St., Vancouver, B.C. and 7 Terminal Road, Halifax, N.S. All applications for factory and magazine licences, certificates for registered premises and permits to transport explosives should be addressed to the Chief Inspector of Explosives, Explosives Division, Department of Mines and Technical Surveys, 238 Sparks St., Ottawa. The Explosives Testing Laboratory of the Division has been established at River Road near Uplands Airport, Ottawa.

Staff

The Inspection Staff of the Division was increased by the appointment of Robert Hunter, formerly of Inspection Services, Department of National Defence.

Legislation

Bill C-83, to amend the Explosives Act, 1946 received Royal Assent on 4 March, its chief purpose being to clarify certain sections of the Act in connection with which difficulties in administration had arisen, and to combine sections dealing with related matters. The amendment appears in Chapter 14, 2-3 Elizabeth II, 1953-54, Statutes of Canada. Following amendment, the regulations under the Act were revised and in that form will be included in the second Consolidation of Statutory Orders and Regulations up to December 31, 1954. The revised regulations were approved by Order in Council P.C. 1954-1801, dated 23 November 1954 and became effective on 8 December 1954, when they appeared in Part II of the Canada Gazette. All amendments made since the last consolidation in 1950 are now incorporated in the revised regulations. Changes were minor except for Part VI which deals with the transportation of explosives by road and private railway. Part VI allows, as formerly, the transportation of explosives up to a maximum of 4,000 pounds without a permit, but for quantities exceeding 4,000 pounds, and not over 10,000 pounds a permit is required. This change was recommended following representations by the mining industry and others engaged in the transportation of explosives in isolated areas, and should prove beneficial to those engaged in the development of resources in remote areas now accessible only by road transport. The regulations have been tightened however in the interests of public safety, so that vehicles carrying larger loads than 4,000 pounds must be placarded, have two men in attendance, travel at restricted speed and may carry either blasting explosives or detonators, but not both, in the same vehicle. The transportation permit issued by the Explosives Division does not override provincial laws or municipal by-laws governing the transportation of explosives, some cities having set limits on the quantity of explosives that may be transported in their environs.

Effective also on December 8, 1954 an amendment revoked Section 1207 of the old regulations which required retailers of small arms ammunition to keep certain records of sales, although Section 26 of the Act places all persons under the obligation of complying with provincial and municipal by-laws which may require the maintenance of such records.

Part XIV of the regulations, approved by Order in Council P.C. 1954-463 of 31 March 1954, has the effect of limiting the quantity of small arms ammunition that may be imported without permit.

Manufacture

The number of factories for which licences were issued in 1954 was 17, a decrease of 2; a toy cap factory and a fireworks factory in Ontario did not renew licences. The list of factories is found in Appendix A of this report.

Production of commercial explosives in 1954 was 115,989,423 pounds, slightly less than that produced in 1953. These figures do not include trinitrotoluene, nitrocotton and nitroguanidine for military purposes, export or incorporation in commercial explosives. Production of T.N.T. and nitrocotton was almost three times that of 1953 but nitroguanidine production decreased. A statement of the total production of explosives, arranged according to classes is found in Appendix B.

Division inspectors made 36 factory inspections in 1954 and consulted frequently with manufacturers concerning licences and other necessary amendments resulting from changing conditions.

Magazines, Registered and Unlicensed Premises

Magazine licences in force have for many years shown a substantial annual increase and in 1954, 472 were issued compared with 450 in 1953. Temporary Magazine Licences dropped from 1,072 in 1953 to 888 in 1954. This decrease was due chiefly to the completion of contracts by oil exploration and construction companies. Registered Premises licences decreased slightly but some were changed to the status of licensed magazines.

Inspections

Inspections of magazines carried out by the inspectors of the division have been supplemented by those made by the R.C.M.P. particularly in remote areas. Their presence as the policing authority in Yukon and Northwest Territories and in 8 of the 10 provinces has made possible much useful inspection and re-inspection of magazines.

The following inspections were made:

Factories.....	36
Magazines.....	1,515
Registered Premises.....	172
Unlicensed Premises.....	3,631

Unlicensed premises were visited chiefly to inspect records of the retail sale of small arms ammunition of calibre in excess of 0.22 inch. Following

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the revoking of Section 1207 of the old regulations, effective December 8, 1954, maintenance of these records was no longer required and accordingly such inspections ceased.

Explosives Laboratory

Tests and analyses of explosives required in the administration of the Explosives Act, the investigation of hazards attending manufacture, storage and shipment of explosives were carried out by Division chemists. Assistance in matters concerning explosives and suspected explosives, was also given to other government departments including Post Office Department, R.C.M.P., and the Departments of Transport and National Defence.

Substantial progress was made in the testing, for fume classification, of explosives used in metalliferous mines in Canada. The results so far indicate that most mining explosives in common use in "hard-rock" mines are in Class 1 of the classification established by the Institute of Makers of Explosives and the United States Bureau of Mines. On detonation, Class 1 explosives produce less than 0.16 cubic feet of noxious fumes per 1½-inch x 8-inch cartridge. When the tests have been completed all explosives in use underground, except "permitted" explosives (i.e. those used in coal mines), will have been examined, and a list of the explosives tested, with their fume characteristics and classification will be prepared.

Two reports were prepared concerning regulations for the ship transportation of ammonium nitrate fertilizer, aeroprills, nitraprills and guanidine nitrate.

Samples examined in the laboratory are classified as follows:

Blasting explosives, etc.....	78
Fireworks, Chinese Firecrackers and Toy Pistol Caps.....	381
Miscellaneous explosives such as small arms ammunition and samples submitted by R.C.M.P., Post Office Department, etc.....	18

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Imports

Explosives imported during the year are listed in Appendix C under Classes and Divisions. Imports of manufactured fireworks decreased to 723,904 pounds in 1954, less than half of the 1953 imports, while imported nitrocotton, used in the manufacture of lacquers, coated fabrics, etc., decreased to 3,454,769 pounds compared with 4,105,572 in 1953, but was still the largest single item imported. Imports of gunpowder rose to 97,221 pounds, more than double that of 1953.

Small arms ammunition, 'safety cartridges', which prior to March 31, 1954 could be imported in any quantity without an import permit, became subject to certain limitations by regulations made under the Act. Part XIV of the regulations now provides that no permit is necessary for the importation of up to 2,000 rounds at one time. For larger amounts application must be made to the Chief Inspector of Explosives for an explosives

import permit. The exemption of 2,000 rounds ensures that most United States and other tourists coming to Canada to hunt, bringing their own ammunition, will not be detained at ports of entry. Since April 1, 1954, 90,200 rounds have been imported by permits issued by the Division.

Imports of explosives of all classes in 1954 were made under authority of 806 permits and 17 annual permits, an increase of 37 over 1953.

Prosecutions

Prosecutions for infractions of the Explosives Act and regulations were instituted in 13 cases; convictions were obtained in 11 and fines imposed, and 2 cases are still before the courts.

A merchant was fined \$50.00 and costs for storing explosives illegally and for selling explosives without a licence; another was fined for keeping explosives in an unlocked receptacle, and two persons were fined for storing small quantities of explosives improperly.

Two construction firms were charged with improper storage of explosives and each fined \$25.00 and costs. Another construction firm was fined for storing blasting explosives and detonators together. Three persons were prosecuted for infractions of transportation regulations; 2 failed to provide red flags on their trucks while transporting explosives and 1 was charged with driving a truck while intoxicated. All were convicted and fined.

A co-operative society operating registered premises to supply explosives to its members was fined for storing in excess of the quantity permitted by the certificate.

Destruction of Explosives

The Division is responsible, under direction of the Minister, for the destruction or disposal of abandoned or deteriorated explosives. During the year 25,426 pounds of blasting explosives, 10,768 detonators, 3,000 pounds of Chinese fireworks, 72 boxes of toy pistol caps and five aerial shells were destroyed.

The small coastal vessel "Prince Mingan", plying the St. Lawrence River, sprang a leak and had to be beached off Cap Chat on the south shore. It had on board a consignment of 5,000 pounds of blasting explosives and 5,000 detonators. Efforts to recover the explosives were only partially successful as the vessel was submerged at high tide, and water damage to both dynamite and detonators was such that destruction became necessary. An inspector of the Division supervised destruction of both types of explosives.

Thefts

During the year, nine magazines and three unlicensed premises were forcibly entered and about 1,100 pounds of blasting explosives, 1,900 detonators and 500 feet of primacord were stolen. Some of the explosives were recovered by the police. Most of the thefts were of small quantities, but 500 pounds of blasting explosives were stolen from a magazine near Montreal, 350 pounds from a magazine near Ottawa and 1,500 detonators

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from a magazine in British Columbia. In the Ottawa district a teen-age boy broke into a magazine and stole 50 pounds of dynamite and some blasting caps. He later removed the paper wrapping from some of the dynamite and packed it into a glass jar and pressed a detonator into the dynamite. He had no safety fuse but succeeded in igniting the detonator with thin slivers of wood. He was unharmed by the explosion but was charged with breaking and entering and given suspended sentence.

Accidents

Appendix D is a tabulation of accidents in which explosives were involved. There were 132 accidents in 1954 resulting in 15 deaths and injuries to 151 persons. The number of deaths was half that of 1953, 15 compared with 29. Records show that the previous low in fatalities was in 1950 when the number was 13; the next best year was 1944, with 15 deaths.

In Manufacture

For the second year in succession no fatality occurred in the manufacture of commercial explosives, either high explosives or detonators. The record established by factories making high explosives still continues with no deaths involving explosives occurring for the past 8 consecutive years. This record is particularly noteworthy as production of commercial explosives reached its highest point during this period. Twenty-four accidents with explosives, mostly minor flashes, were reported and as a result 11 persons were injured. Only one accident brought serious injury and that occurred in a detonator factory.

On December 28, 1954 at the factory of Canadian Industries (1954) Limited, Brownsburg, an explosion of detonators occurred causing serious injury to one man and lesser injuries to another. The seriously injured man was preparing rejected detonators for destruction; the other man was working in an adjoining room and his injuries were indirectly the result of the explosion. The cause of the explosion was not definitely determined but impact or friction on loose powder was thought to be the likely cause. Among the recommendations made were the following:

1. Sub-standard material which is normally under suspicion should be handled in a building detached from those in which routine operations are carried out.
2. Rejected detonators which may be contaminated with loose powder should be dealt with separately and in small quantities. Rehandling should be avoided as much as possible.
3. Process instructions should be kept up to date and strictly followed.
4. Haste should be scrupulously avoided in handling sub-standard explosives.

This accident emphasizes what has been observed on other occasions, that trusted and dependable employees who work alone most of their time should receive more frequent checks by supervisors, and inventories should be more frequently taken of explosives limits in the buildings in which

they work. In this accident licence limits were exceeded and the disposition of the explosives in the building was not in accordance with the process instructions laid down by the manufacturer.

In a fireworks factory in Quebec an operator received severe burns to his right hand when a mixture containing phosphorus that he was screening with an unauthorized tool caught fire. In the same factory a fire started in a machine mixing this composition when the operator was transferring powder from a mixing machine to a "Sealrite" container for storage. No one was injured but there was some damage to the mixing installation. Following both accidents precautionary measures were taken to eliminate a recurrence.

Minor injuries occurred in detonator and ammunition plants where, due to the sensitive nature of the explosives, minor flashes and explosions occur frequently. The relatively small quantities of explosives used and the protective measures taken prevent extensive injury to personnel and damage to equipment.

In Use

Accidents in the use of explosives showed a substantial decrease from last year. The number of accidents dropped from 90 to 70, the number killed from 26 to 12 and the injured from 82 to 72. Numbers killed and injured for the past 10 years average 19.4 and 84.6 respectively so that 1954 was a better than average year.

Following is a tabulation of accidents in the use of explosives for the ten years 1944-1953 inclusive.

	Mines and Quarries		Logging, Construction, Farming, etc	
	Killed	Injured	Killed	Injured
1944.....	4	59	4	20
1945.....	3	46	6	15
1946.....	9	52	10	26
1947.....	16	62	12	43
1948.....	11	65	17	43
1949.....	11	56	11	34
1950.....	4	54	6	24
1951.....	5	48	13	33
1952.....	10	62	16	22
1953.....	6	57	20	25
Average for 10 years.....	7.9	56.1	11.5	28.5
1954.....	5	43	7	29

The number killed and injured in mines and quarries during 1954 showed a significant decrease compared with the average for the ten year period 1944-1953 inclusive. Logging, construction, farming, etc., showed an improvement over 1953 as the number killed dropped from 20 to 7, well below the average for the previous ten-year period. The accident

Report for 1954

rate in mines and quarries continues lower than in the other group of users and if the comparative quantities of explosives are taken into consideration the rate is even more favourable to mines and quarries.

The most common causes of accidents were:

	No. of accidents	Killed	Injured
1. Delaying too long on lighting fuse..	21	5	20
2. Projected debris.....	17	0	18
3. Various.....	10	5	11
4. Drilling into explosives.....	8	1	10
5. Returning too soon after blast....	4	0	4
6. Not taking proper cover.....	4	1	3

Returning too soon after the blast, a common cause of accidents, showed a marked improvement in 1954 over previous years. Again "delaying too long on lighting the fuse" was the chief single cause of accidents.

Following are examples of some of the accidents that occurred:

A blaster for a logging company in British Columbia failed to get away in time from the site of a shot and was instantly killed. He was using electric blasting caps with which he apparently was unfamiliar. He held a provincial blasters' permit but for safety fuse blasting only.

In a quarry in Quebec a workman was fatally burned when black powder exploded and started a fire in a storage building. The cause of the explosion was not determined but a spark, or fire from some source no doubt ignited the explosive.

One man was killed in a mine in Ontario when he drilled into an unexploded charge of dynamite.

In a tunnel construction job in northeastern Quebec an explosion occurred during a thunderstorm killing two men and injuring five. The crew had almost finished loading a round of shots prior to blasting a section of the tunnel when the explosion occurred. It is believed that lightning set off the blast. The safe rule of stopping work during a thunderstorm, especially when using electric detonators was apparently not observed in this case.

An explosion occurred in Quebec when a fire broke out in a workshed. Ten persons were injured, none seriously, but property damage was extensive. The quantity of explosives in the building at the time could not be conclusively ascertained, although the owner claimed it contained no more than three cases. Several houses in the vicinity suffered major damage, one of which will require re-building. Over 100 window frames (not only panes) were broken, some in a building about three quarters of a mile from the explosion, a result not normally compatible with the explosion of this amount of material. Contrary to Explosives Act regulation, dynamite and detonators were stored together, and the shed was heated by an oil stove. Prosecution proceedings were commenced, but no hearing was held before the close of 1954.

At a construction job in New Brunswick the sudden rise of the water level in a river washed away two locked boxes, one containing about 40 sticks of

dynamite and the other 50 electric blasting caps. It was feared the explosives might get into the hands of children, and a local radio station broadcast a warning. As a result, both boxes were recovered within a few hours.

Miscellaneous

In miscellaneous casualties 3 persons were killed and 58 injured, almost the same as 1953, when 3 were killed and 53 injured. In 1954 however, a greater number of accidents occurred, 37 as compared with 27 in 1953. A short summary of the accidents is given in Appendix D.

Many accidents with "home-made" explosives and misfired fireworks were reported. In one of the former a 17-year-old youth in Vancouver lost both hands.

Upon representations by the Division two provincial Druggists Associations publicized the dangers of experimenting with explosives by printing a warning in their Association bulletin and inviting members to co-operate in setting up a voluntary control for the sale of chemicals, particularly potassium chlorate, to 'amateur' chemists who might be tempted to make their own explosive mixtures. The manufacture of explosives and fireworks is restricted to licensed factories which follow carefully controlled processes where the safety of the employee is of first importance. The making of explosives in unlicensed premises, unless specifically permitted by regulations, is a violation of the Explosives Act and persons so doing are liable to prosecution and, upon conviction, to a fine of \$200.00. Boys of high school age are the chief offenders in this regard. Deaths have occurred in some accidents and severe injuries are common, including the loss of hands or fingers or sight. In the interest of their own safety juveniles are warned not to experiment with explosive mixtures of any kind nor to attempt to ignite or break open "dud" fireworks often found near the site of fireworks displays. Children and parents are warned to report to the police any explosive or misfired fireworks found.

APPENDICES

APPENDIX A

Factories Licensed to Manufacture Explosives, 1954

Owner	Location of factory	General nature of product
Canadian Industries Ltd.....	Beloeil, Que.....	Blasting explosives, black powders, propellants.
Canadian Industries Ltd.....	James Island, B.C....	Blasting explosives.
Canadian Industries Ltd.....	Nobel, Ont.....	Blasting explosives.
Canadian Industries Ltd.....	Brainerd, Man.....	Blasting explosives.
Canadian Industries Ltd.....	Brownsburg, Que....	Ammunition, detonators, fusees, etc.
Canadian Industries Ltd.....	Calgary, Alta.....	Blasting explosives.
Canadian Safety Fuse Co.....	Brownsburg, Que....	Safety fuse, detonating fuse, Fuse Lighters.
Canadian Arsenals Ltd.....	Beloeil, Que.....	Time Ring Fuse Powder.
Canadian Arsenals Ltd.....	St. Paul l'Ermite, Que.	Filling military shells, fuses, etc.
Canadian Arsenals Ltd.....	Valcartier, Que.....	Filling military small arms ammunition.
Canadian Arsenals Ltd.....	Valleyfield, Que.....	Military explosives, propellants.
North American Cyanamid Ltd.	Niagara Falls, Ont...	Nitroguanidine.
T. W. Hand Fireworks Co.....	Cooksville, Ont.....	Fireworks and military pyrotechnics.
T. W. Hand Fireworks Co.....	Papineauville, Que...	Military pyrotechnics.
Macdonald Metals and Plastics.	Waterloo, Que.....	Toy pistol caps.
Montreal Fireworks Co.....	Ville St. Pierre, Que..	Display fireworks.
W. F. Bishop & Son.....	Unionville, Ont.....	Fireworks.

Production of Explosives in Canadian Factories, 1954.

	Quantity
Class 1. Gunpowder.....	
Class 2. Nitrate mixtures.....	532,450 lb.
Class 3. Nitro-compounds	
Division 1.....	112,108,887 lb.
Division 2.....	20,852,380 lb.
Class 6. Ammunition *	
Division 1	
Safety Cartridges (rounds).....	254,023,125
Safety fuse and primacord.....	Output of one factory
Railway Track Signals.....	Output of one factory
Percussion caps.....	Output of one factory
Division 2	
“Nitrone” explosives.....	3,348,086 lb.
Division 3—	
Detonators and electric detonators.....	Output of one factory
Class 7. Fireworks	
Division 2	
Commercial and display fireworks, fuse lighters, toy caps and fuseses. (Approx. value).....	\$ 1,564,000.

* Exclusive of artillery ammunition and small arms ammunition made in government factories.

APPENDIX C

Explosives Imported into Canada

Class	Division	Description	Quantity
I	.....	Gunpowder.....	97,221 lb.
II	.....	Nitrate Mixtures.....	60,745 lb.
III	.....	Nitro-compounds:—	
	1	Nitroglycerine Explosives.....	5,777 lb.
	2	(a) Propellants.....	8,560 lb.
		(b) For use in explosive factories.....	1,721,178 lb.
		(c) For other manufacturing purposes.....	3,454,769 lb.
V	.....	Fulminates.....	300 lb.
VI	1	Primers.....	6,300 only
	1	Safety Fuse.....	35,500 ft.
	2	Detonating Fuse.....	102,050 ft.
	3	Detonators.....	582,983 only
		Seismic Explosives.....	31,956 lb.
	1	Ammunition.....	90,200 rounds
		Miscellaneous.....	39,865 lb.
VII	.....	Manufactured Fireworks.....	723,904 lb.

Accidents from Explosives during the Calendar Year 1954

Circumstances or Cause	Mines and Quarries			Elsewhere			Total		
	Acci- dents	Kill- ed	In- jured	Acci- dents	Kill- ed	In- jured	Acci- dents	Kill- ed	In- jured
In Use.									
a Delaying too long in lighting fuse.....	10	1	11	11	4	9	21	5	20
b Premature firing of electrical blasts.....									
c Not taking proper cover.....	2		2	2	1	1	4	1	3
d Projected debris.....	8		9	9		9	17		18
e Returning too soon after blasting.....	4		4				4		4
f Improper handling of misfires.....	1		1				1		1
g Rough tamping.....									
h Ignition of explosives by flames, sparks, etc..									
i Drilling into explosives.....	6	1	8	2		2	8	1	10
j Striking unexploded charge in removing debris	1		1				1		1
k Preparing charges.....				1		1	1		1
l Using too short a fuse.....									
m Insufficient ventilation after blasting.....	3		3				3		3
n Springing shots.....									
o Inadequate guarding.....									
p Various.....	7	3	4	3	2	7	10	5	11
Total.....	42	5	43	28	7	29	70	12	72
In Manufacture.....							24	0	11
In Keeping.....							1		10
In Conveyance (other than by railway).....									
Total.....							95*	12	93
Miscellaneous									
(a) Playing with detonators.....							14		20
(b) Playing with other explosives.....							17	1	27
(c) Various.....							6	2	11
Total.....							37†	3	58
Totals all circumstances....	42	5	43	28	7	29	132	15	151

* Except for these, accounts of which are given in the text, the accidents given in this table occurred in circumstances not directly controlled by the Act.

† Circumstances are given on next page.

APPENDIX D

Part II

Playing with Detonators

Ref. No.	Cause of Accident	Killed	Injured
18	Two 9-year-old boys found some dynamite caps in a trailer owned by a construction company. They inserted a lighted match in the open end of one cap and it exploded causing one boy to lose a thumb and three fingers and the other boy to receive burns.....		2
48	Three teen-age boys broke into a locked box where electric blasting caps were stored by a construction company and stole 73 caps. They then proceeded to set off the caps by means of a battery. One of the boys held a cap too long and it exploded blowing two fingers off his right hand.....		1
55	Two young boys were injured, one seriously, playing with blasting caps. They found several near a vacant lot and built a fire into which they threw the caps. The caps exploded blinding one boy with flying fragments and causing injuries to the other boy.....		2
85	Two boys, ages 6 and 8, were injured when they found some blasting caps near a sewer job and pounded them with a stone.....		2
91	A 12-year-old boy found some detonators in an alley and tried to set them off. While holding one in his hand it exploded causing serious injury to his right eye, and thumb, index and ring finger of his left hand.....		1
92	Two boys, 11 and 14 years of age, obtained some fused blasting caps from a quarry shack by breaking a window and reaching into where the fused caps were hanging. The older boy held one cap in his hand and lit the fuse and thinking the fuse had gone out attempted to re-light it. In the explosion that followed he lost a thumb and two fingers of his left hand.....		1
93	Some children found three blasting caps at the side of a road and took them home. They used them as cigarettes and an 8-year-old girl tried to light one when it exploded blowing two fingers off her left hand and causing injuries to her right eye.....		1
106	A 22-year-old workman for a construction company was playing with a detonator when it exploded causing serious injuries to his face.....		1

Playing with Detonators—Continued

Ref. No.	Cause of Accident	Killed	Injured
108	Two 18-year-old youths on a hike found some old blasting caps probably left by a prospector. They attempted to light one and it exploded causing serious eye injuries to one of the boys.		2
190	Two boys, 9 and 10 years old, claimed they had obtained several sticks of dynamite, blasting caps and fuse by forcing the lock of a quarry magazine. They tried to set off the dynamite and failing this tried to burn it, finally holding a lighted match to one of the detonators causing it to explode. Both boys suffered facial injuries one of which required fifteen stitches.		2
207	An 8-year-old boy found an old copper blasting cap in a jug in his home. The jug contained buttons, pins and an assortment of odds and ends and had been in the house for many years. The boy tried to pick into the cap with a pin and it exploded causing injuries to his left hand.		1
208	A 15-year-old boy lost several fingers of his left hand when he stuck a needle into a blasting cap he had found on the road and caused it to explode.		1
158	Two 6-year-old boys found a box of blasting caps in an old abandoned car. They placed a lighted match in one of the caps and it exploded causing burns and facial injuries to both boys. The caps had apparently been left by a well driller about four years before.		2
175	A young man employed by a construction firm stole detonators and took them home. While he was examining them in his room two of the detonators exploded causing injuries to his neck and ear.		1

APPENDIX D

Part II

Playing with Other Explosives

Ref. No.	Cause of Accident	Killed	Injured
-------------	-------------------	--------	---------

Home-made Explosives

14	Two youths were found in possession of three home-made bombs made of pieces of gas pipe filled with blasting powder and fused. They claimed they were carrying the bombs for "protection".		
24	A home-made bomb shattered a 15-year-old boy's hand as he set it off. His friend, age 14, was also injured. The boys had made the bomb from a copper pipe filled with chemicals they had purchased from a local drug store.....		2
38	Three young boys tried to blast their way into a hardware store with a home-made bomb. They were not injured but were turned over to juvenile authorities.		
171	A 17-year-old high school student was making up home-made bombs to use on Hallowe'en. He filled a metal pipe with a mixture of chemicals containing potassium chlorate and placed a threaded pipe cap on the end of the pipe. When he attempted to tighten the cap the "bomb" exploded. He lost both his hands.....		1

Fireworks

61	A boy tossed a lighted firecracker into a carriage severely burning a baby.....		1
68	Three boys, ages 10 to 13, were burned, two severely, when a fireworks bomb they were playing with exploded. The firework was one that had failed to go off during a display.....		3
76	A firecracker set off by an 8-year-old boy was blamed for a fire that caused \$100,000 damage.		
83	Ten children were reported injured by fire-crackers during a Victoria Day celebration.....		10
135	Two persons were injured by firecrackers during a college initiation parade.....		2
138	A man lost his left hand and two boys, age 12 and 13, were injured when they lit a firework bomb that had failed to ignite during a display.....		3

Playing with Other Explosives

Ref. No.	Cause of Accident	Killed	Injured
203	A boy died from injuries received from an exploding firework he had found on a fairground. He applied a light to it and it exploded.....	1	
206	Two men were setting off fireworks from a boat during a celebration when one of the fireworks backfired, igniting the rest. One man lost his right arm, and the other suffered burns and shock.....		2
214	A 9-year-old boy ignited a large firework he had found on fair-grounds. It exploded, breaking windows and causing other damage to a house. The boy was not hurt....		

Dynamite

42	Four boys, ages 4 to 6, were found playing "catch" with a stick of dynamite they had picked up in a nearby stone quarry. The dynamite was removed to a safe place before any harm was done and a search of the surrounding area was made for any more lost sticks.....		
140	As a prank a young man inserted a fused cap into stick of dynamite, lit the fuse and held the stick outside the window of the car in which he was a passenger. He lost a hand.....		1

Ammunition

161	A caretaker at an army camp fired a rifle bullet into a magazine setting off 900 pounds of explosives. He was seriously injured and had to have his left arm amputated.....		1
172	An 11-year-old boy lost an eye when he struck a .22 calibre bullet with an axe.....		1

APPENDIX D

Part II

MISCELLANEOUS

Ref. No.	Cause of Accident	Killed	Injured
1	A seven-year-old girl was seriously injured by a rock thrown by a blast at an excavation project.....		1
50	Two men were injured, one seriously, when a stick of dynamite they had in a boat exploded. They were believed to have been dynamiting fish.....		2
69	A 15-year-old girl was killed and her mother and two sisters seriously injured when five sticks of a permitted explosive, placed in the oven of a kitchen stove to dry, exploded.....	1	3
107	One aeroplane mechanic was killed and another seriously injured when a seat ejector exploded while they were making repairs.....	1	1
168	Two persons were injured by flying rocks in a blast set off on a construction job.....		2
204	Two civilian workers at a Navy base were injured when a primer that was being removed from a cartridge case exploded.....		2

Authorized Explosives

Canadian Industries (1954) Limited (Explosives Division):

Ammonia Dynamite—20, 25, 30, 35, 40, 50 and 60 per cent.
 Ammonia Dynamite—55 per cent (for export only).
 Ammonia Dynamite—Extra 20, 70 per cent (for export only).
 Ammonia Dynamite quarrying—60 per cent.
 Ammonia Gelatin—30, 35, 40, 50, 60, 75, 80, 90 per cent (for export only).
 Black Blasting Powder.
 Black Sporting Powder.
 Blastol—60 per cent.
 BRX-7—75 per cent.
 BRX-7 (D.N.T.)—75 per cent.
 Cilgel—50 per cent.
 Cilgel—(D.N.T. or T.N.T.)—50 per cent.
 Cordite—MD, MDT, W, WT, WM, WMT.
 C-X-L Dynamite—Nos. 1, 2, 3 and 4.
 C-X-L Gelatin—Nos. 1 and 2.
 C-X-L-ite.
 Di-Drill Gelatin—60 per cent.
 Ditching Dynamite—50 per cent.
 Ditching Dynamite—(D.N.T.)—50 per cent.
 Driftite—70 per cent.
 Driftite (D.N.T. or T.N.T.)—70 per cent.
 Dygel—75 per cent.
 Dynamex (Diameters 1" to 1½" incl.)—40, 50, 60 and 70 per cent.
 Dynamex (Diameters 1½" and over)—40, 50, 60 and 70 per cent.
 Explosives—BL-100—60 per cent.
 BL-103
 BL-106
 Forcite—30, 35, 40, 40 (Asbestos Corporation),
 (bagged), 80 and 90 per cent.
 Forcite—(Brainerd Series)—30, 40, 50, 60 and 75 per cent.
 Forcite—(D.N.T. or T.N.T. Series)—30, 35, 40, 40 (Asbestos Corp.),
 50, 60, 75, 75 (bagged),
 80 and 90 per cent.
 Free Running Ammonia Dynamite—65 per cent.
 Fuse Powders—30, 40, 44, 53, 57 and 65 seconds.
 Gelatin Dough—90 per cent.
 Gelatinized Dynamite—60, 75 per cent (for export only).
 Geogel.
 Gelignite—62 per cent.
 Giant Gelatin—30, 35, 40, 50, 60, 75, 80 and 90 per cent.
 Giant Gelatin (Brainerd Series)—40 and 60 per cent.
 Giant Gelatin (D.N.T. or T.N.T. Series)—20, 25, 30, 35, 40, 50, 60, 75
 80 and 90 per cent.
 Guhr Dynamite.
 Guncotton.
 Gunpowder.
 Gypsumite "A", "B" and "C".
 Hi-Velocity gelatin—60 and 80 per cent.
 Liquid Nitroglycerine.
 Lump-Kol Pellet Powder.
 Monobel, Nos. 4, 6, 7, 10, 11 and 14.
 Monobel, sheathed—Nos. 4, 7 and 10.
 Monobel, X (EQ.S.)
 Nitrocotton.
 Nitrone T-4.
 Nitrone T-1 (3 formulae).

APPENDIX E

Authorized Explosives

Canadian Industries (1954) Limited (Explosives Division):—*Continued.*

Nitrone S-1.
Nitrone S-1 Primer.
Nitrone Primer.
Nitrox.
Pellet Powder No. 2.
Polar Stumping Powder—20 per cent.
Signal Bombs.
Semi-Gelatin No. 1.
S.N.G.
“Special No. 1” Dynamite.
Special Gelatine, 60, 75, 80, 90 per cent (for export only).
Stopeite, 20, 25, 30, 35, 40, 50, 55 and 60 per cent.
Straight Gelatin—25, 30, 35, 40, 50, 60, 75, 80 per cent (for export only).
Submagel—60, 75 and 95 per cent.
Trinitrotoluene.
Vibrex—60 per cent.

Canadian Safety Fuse Company, Limited.

“B-Line” detonating fuse.
Safety fuse—“Beaver” Brand.
Safety fuse—“Black Clover” Brand.
Safety fuse—“Black Pacific” Brand.
Safety fuse—“Clover” Brand.
Safety fuse—“Crown” Brand.
Safety fuse—“Moose” Brand.
Safety fuse—“Pacific” Brand.
Safety fuse—“White Jacket” Brand.
Safety fuse—“Yellow Jacket” Brand.
Hot Wire Fuse Lighters.
Igniter Cord—“Thermalite” Brand. Types A and B.
Primacord-Bickford Detonating Fuse.

Canadian Industries (1954) Limited (Ammunition Division).

Ammunition.
Detonators.
Dextrinated Lead Azide.
Fuse Igniting and Connecting device.
“Lead Salt”.
Lead Styphanate (Normal).
Percussion Caps.
Railway Fusees.
Railway Torpedoes.
Safe-T-Lite Highway Fusee.
Styphnic Acid.
Tetrazene.
Igniter Cord Electric Starter.
Primacord MS Connector.

Authorized explosives manufactured by other than Canadian firms:—

Fred Allen, Houston, Texas.

Cartridges for “Super-gun”.

Atlas Diesel Company, Stockholm, Sweden.

Engine Starting Cartridges (including Ignition Papers and Caps).

Authorized Explosives

Authorized explosives manufactured by other than Canadian firms:—*Continued*

Atlas Powder Company, Wilmington, Del.

Shaped Charges.

Detonators (Blasting Caps).

Cardox Corporation, Chicago, Ill.

Cardox.

Cardox Heaters.

Cartoucherie Francaise, Paris, France.

.22 Blank Cartridges.

Central Railway Signal Company, Boston, Mass.

Railway Torpedoes.

Dynamit-Actien-Gesellschaft, Nurnberg 2, Germany.

RWS-Flobert Blank Cartridges 6 mm.

De Kruithoorn N. V. Nederlandsche Jachtpatroonfabriek 'sHertogenbosch, Holland

Shotgun Shells, 12, 16, 20 gauge.

E. I. DuPont de Nemours & Company, Inc., Wilmington, Del.

Auxiliary Charges C. 63.

Detonators.

DuPont Bulk Powder.

DuPont Pistol Powder No. 6.

Explosives Rivets.

Fulminate of Mercury.

High Temperature E. B. Caps, No. 6.

Improved Military Powders.

Jet Tappers.

Oil Well Explosives S.O.W.E. No. 1 and EL-431-A.

Nitramex No. 2.

"Nitramon S".

"Nitramon S" Primers.

Nitrocellulose.

Nitrostarch.

Open hole Shaped Charges (R.D.X. or Pentolite).

P. 6 Seismograph Booster.

Pelletol Nos. 1 and 2.

Perforating Shaped Charges (R.D.X. or Pentolite).

P.E.T.N.

"Primacord" Booster.

Pyro (ground smokeless) Powder.

R.D.X. Cord.

Smokeless Powders.

Sporting Rifle Powders.

Tetryl.

Waterproof Boosters C. 66.

Ellefsens Tendskruefabrikk, Stokke, Norway.

Time Fuses and Detonators for Whaling Guns.

Ensign Bickford Company, Simsbury, Conn.

Ignitacord.

Primacord Bickford Fuse.

APPENDIX E

Authorized Explosives

- ETS. Brandt, La Ferte St. Aubin (Loiret) France.
Shaped Charges 3 $\frac{3}{8}$ ".
- ETS. Billant, Usine Du Prado, Bourges 9 (Cher) France.
Shaped Charges 3 $\frac{3}{8}$ ".
- Federal Laboratories, Pittsburgh, Pa.
Lachrymatory Cartridges.
Powder Loads.
- Charles Hellis & Sons Limited, London, England.
12 Gauge Shotgun Shells.
- Hercules Powder Company, Wilmington, Del.
Detonators.
Gelatin Oil Well Explosives.
Nitrocellulose.
Smokeless Powders.
Vibro Caps.
Vibrogel B and 3.
- Hull Cartridge Co., Hull, Yorkshire, England.
Shotgun Cartridges, 12 gauge.
- Illinois Powder Manufacturing Company, St. Louis, Mo.
Detonators, Gold Medal Oil Well Explosive, 100 per cent.
- Imperial Chemical Industries Limited, England.
Cerium Low Tension Fuseheads.
Detonating Relays.
Percussion Caps.
- Independent Eastern Torpedo Company, Findlay, Ohio.
Nitroglycerine.
- Jet Perforators Inc., Fort Worth, Texas.
Glass Gun Jet Perforating Charges, G.G. 2, G.G. 4, G.G. 7.
- Lake Erie Chemical Company, Cleveland, Ohio.
Lachrymatory Cartridges.
- Lane-Wells Company, Los Angeles, Cal.
Gun Perforator Cartridges.
- Mid Continent Torpedo Company, Ltd., Tulsa, Oklahoma.
Red Head Firing Heads.
- Mine Safety Appliances Company, Pittsburgh, Pa.
Stud Units for Velocity Power Driver.
- Olin Mathieson Chemical Corporation, New Haven 4, Conn.
Cyclonite.
- Pacific Railway Signal Company, Peru, Ind.
Railway Torpedoes.

Authorized Explosives

- Perforating Guns Company Inc., Houston, Texas.
Jet Perforating Charges.
- Poudre Rie Nationales, France.
D-2 Propellant Powder.
- John R. Powell, Plymouth, Pa.
Miners' Safety Squibs.
- Randolph Company, Houston, Texas.
Micro-log cartridges.
Baker plug setting tool cartridges.
- Remington Arms Company, Inc., Bridgeport, Conn.
Stud Driver Cartridges.
- F. J. Roberts Squib Company, Punxsutawney, Pa.
Miners' Safety Squibs.
- Rohm-Gesellschaft, Sonthiem/Brenz, Kreis Heidenheim, Germany.
6 mm. Blank Cartridges.
- Shaped Charge Manufacturers Inc., Martinsburg, W. Va.
Plurajet Blasting Units (Not for underground use).
- Trojan Powder Company, Allentown, Pa.
Nitrostarch.
- Western Cartridge Company, East Alton, Ill.
Detonators.
Kiln Gun Shells.
Western Ball Powder.
- Winchester Arms Company, Cleveland, Ohio.
"Tempotool" Cartridges.

Authorized Manufactured Fireworks

Fireworks Manufactured by the following Canadian makers are authorized:

- W. F. Bishop & Son Limited, Toronto, Ont.
Canadian Industries Limited.
Canadian Safety Fuse Company Limited, Brownsburg, Que.
Dominion Fireworks Company, Limited, Dixie, Ont.
T. W. Hand Fireworks Company, Limited, Cooksville, Ont.
Macdonald Metals and Plastics Limited, Waterloo, Que.
Montreal Fireworks Displays Manufacturing Company, Ville St. Pierre, Que.
Superior Toys, Waubaushe, Ont.

Certain fireworks manufactured outside of Canada by the following makers are authorized:*

- Acme Fireworks Corporation (Acme Novelty Manufacturing Company) River Grove, Ill.
Aerial Products Incorporated, Merrick, L.I., N.Y.
American Railway Signal Company, Fostoria, Ohio.

* A list of authorized fireworks is on file in the office of the Explosive Division. Information may be obtained on request.

APPENDIX E

Authorized Manufactured Fireworks

Anthes Force Oiler Company, Fort Madison, Iowa.
 Astra Fireworks Ltd., London, England.
 Atlas Fireworks Company, Inc., Los Angeles 22, Cal.
 M. Backes & Sons Limited, Wallingford, Conn.
 J. G. W. Berchkholtz, Hamburg-Bahrenfeld, Germany.
 Oswald Bradley Ltd., Southport, Lancs., England.
 Brookside Pyrotechnic & Chemical Company, Elkton, Md.
 C. T. Brock & Company, Hemel Hempstead, Herts, England.
 Central Railway Signal Company, Boston, Mass.
 Columbia Manufacturing Company, Elkton, Md.
 Continental Fireworks Manufacturing Company, Dunbar, Pa.
 J. Halpern Company, Pittsburgh, Pa., Distributors for Lenover Corporation, Chester, Pa., and Lenover, Pa.
 Thos. Hammond & Company, Craigmillar, Edinburgh, Scotland.
 Hudson Fireworks Display Company, Hudson, Ohio.
 Hitt Fireworks Company Limited, Seattle, Wash.
 Interstate Fireworks Company, Springfield, Mass.
 Japan Fireworks Trading Company Limited, Tokyo, Japan.
 Jatina Manufacturing Company, Inc., Mount Vernon, N.Y.
 Kemode Manufacturing Company Inc., New York, N.Y.
 Kent Manufacturing Corporation, Chestertown, Md.
 Kilgore Manufacturing Company, Westerville, Ohio.
 Lakeside Railway Fusee Company, South Beloit, Ill.
 Lenover Corporation, Chester, Pa., and Lenover, Pa. J. Halpern Company, Pittsburgh, Pa., Distributors.
 Marutamaya Ogatsu Fireworks Company, Tokyo, Japan.
 National Fireworks Incorporated, West Hanover, Mass.
 New Jersey Fireworks Manufacturing Company, Inc., Elkton, Md.
 Nichols Industries, Pasadena, Texas.
 Pacific Railway Signal Company, Peru, Ind.
 N. V. Pyro, Klazienaveen, Holland.
 Pyrotechnischen Fabriken, Wuppertal-Ronsdorf, Germany.
 Pyrowerk, Hamburg-Neugraben, Germany.
 Red Flare Signal Company, Toledo, Ohio.
 Reliance Snap Company, Bishop's Stortford, Herts, England.
 Schermuly Pistol Rocket Apparatus Limited, Newdigate, Surrey, England.
 Standard Fireworks Limited, Huddersfield, England.
 Standard Railway Fusee Corporation, Boonton, N.J.
 Saburo Inagaki, Okazaki City, Japan.
 Saburo Ishibashi, Tokyo, Japan.
 J. and E. Stevens Sales Company, New York.
 Thearle-Duffield Fireworks Incorporated, Chicago, Ill.
 Twin City Fireworks Company, Buffalo, N.Y.
 Unexcelled Manufacturing Company, New York.
 United Fireworks Manufacturing Company, Dayton, Ohio.
 Van Karner Chemical Arms Corporation, New York.
 Joseph Wells & Sons Limited, Dartford, Kent, England.
 Joh. Chr. Wendt, Hamburg, Gr. Borstel, Germany.
 Wunderkerzen-Werk Carl Fleming, Hamburg-Neugraben, Germany.

Chinese firecrackers with gunpowder composition, and not exceeding 4 inches in length and $\frac{9}{16}$ inch in diameter, and small Chinese fireworks are authorized when found to function satisfactorily on examination at port of entry.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1955